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30 June 2005

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(54) Title: HYBRIDIZATION-BASED BIOSENSOR CONTAINING HAIRPIN PROBES AND USE THEREOF

(57) Abstract: A sensor chip that includes: a fluorescence quenching surface; a nucleic acid probe that contains first and second ends with the first end bound to the fluorescence quenching surface, a first region, and a second region complementary to the first region, the nucleic acid probe having, under appropriate conditions, either a hairpin conformation with the first and second regions hybridized together or a non-hairpin conformation; and a first fluorophore bound to the second end of the first nucleic acid molecule. When the first nucleic acid molecule is in the hairpin conformation, the fluorescence quenching surface substantially quenches fluorescent emissions by the first fluorophore; and when the first nucleic acid molecule is in the non-hairpin conformation, fluorescent emissions by the fluorophore are substantially free of quenching by the fluorescence quenching surface. Various nucleic acid probes, methods of making the sensor chip, biological sensor devices that contain the sensor chip, and their methods of use are also disclosed.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/00093

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C12Q 1/70; C12P 19/34; C07H 21/04
US CL : 435/6, 91.1; 536/23.1, 24.3

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 435/6, 91.1; 536/23.1, 24.3

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
East, STN

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,312,906 B1 (CASS et al.) 6 November 2001 (6.11.01)	1-24, 26-42, 44-66
Y		25, 43

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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document member of the same patent family

Date of the actual completion of the international search

18 April 2005 (18.04.2005)

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/00093

Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.b of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, the international search was carried out on the basis of:

a. type of material



a sequence listing



table(s) related to the sequence listing

b. format of material



in written format



in computer readable form

c. time of filing/furnishing



contained in the international application as filed



filed together with the international application in computer readable form



furnished subsequently to this Authority for the purposes of search

2. ☐

In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

3. Additional comments: